H10670

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

DESCRIPTIVE REPORT

Type of Survey HYDROGRAPHIC/ SIDE SCAN SONAR

Field No. WH-10-02-96

Registry No. H-10670

LOCALITY

State SOUTH CAROLINA

General Locality NORTH ATLANTIC OCEAN

Sublocality 4.0 NM SOUTHEAST OF RATTLESNAKE SHOAL

19 96

CHIEF OF PARTY

CDR M. R. KENNY, NOAA

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DIAGRAM 1239-3

Charts

NOAA FORM 77-28
(11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY NUMBER:

H-10670

HYDROGRAPHIC TITLE SHEET

INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

FIELD NUMBER:
WH-10-2-96

State: South Carolina

General locality: North Atlantic Ocean

Locality: 4.0 NM Southeast of Rattlesnake Shoal SC

Scale: 1:10,000 Date of survey: April 5 to May 23, 1996

Instructions dated: March 5, 1996 and CH No. 1 dated March 13, 1996 Project Number: OPR-G342-WH

Vessel: NOAA Ship WHITING (S-329)

Chief of Party: CDR Maureen R. Kenny, NOAA

Surveyed by: M.R. Kenny, A.L. Beaver, P.A. Gruccio, J. Pikulsky, C.E. Parrish, E.J. Sipos, G. Garte, U.L. Gardner, M.M. Cisternelli, K. Shaver, F.R. Cruz

Soundings taken by echo sounder, hand lead-line, or pole: DSF 6000N fathometer

Gaphic record scaled by: WHITING personnel

Graphic record checked by: WHITING personnel

acted by: N/A Automated plot by: HP 7959, Bruning (Field) ENCAD NovaJet III Plotter (AHB)

verification by: Atlantic Hydrographic Branch Personnel

Soundings in: Feet: ✓ Fathoms: ____ Meters: (*) at MLW: ____ MLLW: (*):

Remarks: Notes in The Descriptive Report were made in Red during Office Processing.

Time zones used: 0 (UTC)

Horizontal Datum used: NAD 83

SURF ✓ & AWOIS ✓ 4/2/97 by MBH

SC 6-8-97

NOAA FORM 77-28 SUPERSEDES FORM C & GS - 537 * U.S. GOVERNMENT PRINTING OFFICE: 1976-665-661/1222 REGION NO.6

DESCRIPTIVE REPORT TO ACCOMPANY
HYDROGRAPHIC SURVEY
OPR-G342-WH
WH-10-2-96
H-10670

NOAA SHIP WHITING
CDR Maureen Kenny, NOAA
Commanding Officer

A. PROJECT

The purpose of this project is to update charted hydrography in the approaches to Charleston, South Carolina. The project is being conducted in response to requests from the Charleston Branch Pilots Association. Project OPR-G342-WH consists of four survey sheets. The survey described in this report was designated "A" sheet, field sheet number WH-10-2-96, and registry number H-10670. Survey Operations were conducted in compliance with the Hydrographic Project Instructions OPR-G342-WH dated March 5, 1996, and Change Number 1 dated March 13, 1996.

B. AREA SURVEYED

Hydrographic survey H-10670 is located four nautical miles southeast of Rattlesnake Shoal, South Carolina. The limits of hydrography are bounded by the following positions:

Position	Latitude	Longitude
1	32° 43' 24.25" N	079° 47' 29.31" W
2	32° 43' 24.25" N	079° 42' 37.48" W
3	32° 36' 44.94" N	079° 42' 37.77" W
4	32° 36' 44.94" N	079° 43' 08.54" W
5	32° 41' 37.81" N	079° 47' 29.31" W

This survey also contains an inset which is bounded by the following positions:

Position	Latitude	Longitude
1	32° 43' 35.62" N	079° 49' 06.22" W
2	32° 43' 35.62" N	079° 47' 22.18" W
3	32° 41' 45.27" N	079° 47' 22.18" W

Survey operations commenced on April 5, 1996 (DN 096) and concluded on May 23, 1996 (DN 144).

C. SURVEY VESSELS

NOAA Ship WHITING (vessel number 2930), launch 1015 (vessel number 2931) and launch 1014 (vessel number 2932) were used to conduct mainscheme sounding data acquisition, side scan sonar, crosslines, sound velocity casts, mainscheme echosounder splits, bottom samples, AWOIS investigations, and dive operations. No unusual problems or equipment configurations were encountered.

D. AUTOMATED DATA ACQUISITION AND PROCESSING *See Also Evaluation Report*

Survey data acquisition and processing were accomplished using the HDAPS system with the standard HDAPS software dated March 28, 1996. Sound Velocity corrections were determined using *CAT* version 2.00 and *VELOCITY* version 2.11. The DGPS station was checked using *MONITOR* version 1.2. The MOD III Diver Least Depth Gauge was checked using the *DAILYDQA* program. There were no nonstandard automated acquisition or processing methods used.

E. SIDE SCAN SONAR EQUIPMENT

Side scan sonar (SSS) operations were conducted using an EG&G model 260 slant-range corrected SSS recorder and an EG&G 272-TH dual-channel, dual-frequency towfish. The towfish was operated on the 100 kHz frequency and configured with a 20° beam depression. The following SSS equipment was used:

Vessel	Type	S/N	DN
2930	Towfish	011908	096-127
	Towfish	016630	128-144
	Recorder	016946	096-139
	Recorder	016942	140-144
2931	Towfish	016630	096-108
	Towfish	011591	109-144
	Recorder	016669	096-144
2932	Towfish	010823	096-107
	Towfish	011904	108-144
	Recorder	016673	096-144

On NOAA Ship WHITING, the SSS towfish was deployed from a Reuland winch using one of

two armored cables in conjunction with an A-frame on the stern. The armored cable was connected to the SSS recorder by a slip-ring assembly. On launches 1014 and 1015, the SSS towfish was deployed using a Superwinch in conjunction with an adjustable davit arm on the stern. The SSS towfish was towed with a vinyl-coated Kevlar cable and was connected to the recorder by a slip-ring assembly.

This survey required 200% side scan sonar coverage. Proper coverage was achieved by running mainscheme lines with either 80-meter line spacing at the 100-meter range scale, 55-meter line spacing at the 75-meter range scale, or 35-meter line spacing at the 50-meter range scale, depending on the depth of water. This line spacing provided for proper overlap as required by Field Procedures Manual, section 7.3.2.2. Adequate coverage was ensured by plotting alternate mainscheme lines on 'A' and 'B' swath plots and verifying 100% coverage on each plot.

The towfish was maintained at a height off the bottom of 8-20 percent of the range scale. Side scan operations were limited to a speed-over-ground of 4-6 knots. Confidence checks were performed by noting changes in linear bottom features extending to the outer edges of the sonargram, and by passing aids to navigation.

Contacts were measured off the sonargram and entered into an HDAPS contact table.* Using the contact utility program, WHITING hydrographers determined contact heights, positions, and correlations to other contacts. Contacts appearing significant were further investigated by SSS development then by divers if deemed necessary. Least depths were determined by a MOD III Diver Least Depth Gauge (S/N 68332) and final positioning of significant items was determined with detached positions taken on diver-placed buoys.*

F. SOUNDING EQUIPMENT

Raytheon Digital Survey Fathometer (DSF-6000N) echosounders were used to measure water depths during the survey. The DSF-6000N produced a graphic record of the high frequency (100 kHz) and low frequency (24 kHz) depths. The high and low frequency digital depths were recorded by the HDAPS acquisition system. The high frequency depths were selected as the primary depths and were used for plotting. All echograms were scanned for significant features and any significant features that were not selected as primary soundings were manually inserted.

The following fathometers were used:

Vessel	S/N	DN
2930	C076	096-144
2931	C066	096-144
2932	A116N	096-109
	B051N	110-144

* DATA filed with Field Records.

Electronic technicians performed accuracy checks and preventive maintenance on all of the DSF-6000N echosounders used.

Least depths on diver investigations in the survey area were acquired using the MOD III Diver Least Depth Gauge (S/N 68332).

G. CORRECTIONS TO SOUNDINGS

Sound velocity profiles of the water column were determined using a Seacat Conductivity, Temperature and Depth (CTD) profiler (model SBE-19, S/N 286 and S/N 1060). The CTD profilers were calibrated on January 10, 1996. The Seacat calibration records are included in the Separates, section IV.*

A corrector table was generated for the ship (vessel number 2930) for each velocity cast taken. Additionally, a corrector table was generated for the launches (vessel numbers 2931 and 2932). The following table shows the dates, locations and the table depths of each velocity cast that was applied to the data collected in this survey area:

DN	Velocity Table #	Latitude	Longitude	Depth
110	3 (ship)	32° 41' 11" N	079° 41' 55" W	18.3 m
114	6 (ship)	32° 41' 19" N	079° 44' 05" W	18.5 m
114	7 (launches)	32° 41' 19" N	079° 44' 05" W	18.5 m
129	12 (ship)	32° 43' 24" N	079° 48' 34" W	20.4 m
129	13 (launches)	32° 43' 24" N	079° 48' 34" W	20.4 m
138	18 (ship)	32° 33' 12" N	079° 40' 11" W	23.7 m
138	19 (launches)	32° 33' 12" N	079° 40' 11" W	23.7 m
144	21 (launches)	32° 43' 12" N	079° 48' 14" W	23.7 m

Additional sound velocity casts were taken to ensure a uniform water column over the project area. When the shallow water casts were similar to deeper casts, only the deeper casts were used. Each cast was processed and corrector tables generated using *CAT* version 2.00 and *VELOCITY* version 2.11. The velocity correctors were manually entered into an HDAPS velocity table where correctors were applied to both the high and low frequency beams during data acquisition. Velocity profile data are included in the Separates, section IV.*

Data Quality Assurance (DQA) for the Seacat CTD profilers was performed by using a hydrometer and a thermometer to measure the density and temperature of a surface water sample taken during the CTD cast. The *CAT* program compared these values to the Seacat's surface values and confirmed that the Seacat was working properly. WHITING hydrometers were calibrated on March 25, 1996. Correctors were applied to the readings taken from the hydrometer.

* DATA Filed with Field Records.

There were no variations in instrument initials.

The *DAILDQA* program used in conjunction with the ship's barometer was used to assure that the MOD III Diver Least Depth Gauge was working properly. Daily results fell within specified operating ranges. CTD casts were used in the *SMLGAUGE* program to calculate least depth measurements.

Bar checks were performed on launches 1014 and 1015 on April 22, 1996 (DN 113). No corrections to soundings were needed. Copies of the bar check data are included in the Separates, section IV.*

A leadline comparison was performed on WHITING while in the project area on April 22, 1996 (DN 113). Leadlines used were calibrated on December 14, 1995, and the calibration confirmed that the leadline error was negligible. Weather and sea conditions were calm and proved ideal for performing the leadline comparison. The results showed excellent agreement with DSF-6000N high frequency depths averaging 0.04 meters deeper that leadline depths. Copies of the leadline comparison data are included in the Separates, section IV.*

The correction for the static draft for launches 1014 and 1015 is 0.55 meters and was measured on July 28, 1993. The corrector was entered into Offset Tables 2 and 1,* respectively. The correction for static draft for WHITING is 3.2 meters, a historical value which WHITING divers confirmed with a MOD III Diver Least Depth Gauge on May 11, 1995. The corrector was entered into Offset Table 9.* Static draft correctors were applied to the sounding data in real time for each survey platform.

Settlement and squat values for launch 1014 were determined on March 25, 1996, and were entered into Offset Table 2.* Settlement and squat values for launch 1015 were determined on March 18, 1996, and were entered into Offset Table 1.* Settlement and squat values for WHITING were determined on March 26, 1996, and were entered into Offset Table 9.* The settlement and squat correctors were applied to the sounding data in real time for each survey platform. Offset tables are included in the Separates, section II.*

Heave correctors for launch 1014 and 1015 were applied during post processing by manually scanning the echograms and making the appropriate corrections. For data acquired by WHITING, the HDAPS data acquisition computer logged and applied, in real time, heave data from a heave, roll and pitch sensor (HIPPY, S/N 19109-C).

The tidal datum for this project was Mean Lower Low Water (MLLW). The operating tide station at Charleston, South Carolina (866-5530) served as the reference station for predicted tides. Tidal data used during data acquisition were based on Table 2 of the East Coast of North and South America Tide Tables. Digital tidal data were received on floppy disk from N/CS33, Hydrographic Surveys Branch and were applied to the digital data during acquisition by HDAPS. Approved Tides and Zoning were Applied during Office Processing.

* DATA Filed with Field Records.

Time and height correctors used for this survey are as follows:

Time Correction	- 00 hrs 24 mins
Height Ratio	x 0.95

No subordinate tide stations were required for this survey. The Charleston tide station (866-5530) is maintained by the Atlantic Operation Section (N/OES213).

H. CONTROL STATIONS See Also Evaluation Report.

The horizontal datum for this project is the North American Datum of 1983 (NAD 83). The source of differential correctors used was a USCG maintained Differential GPS station at Charleston, South Carolina. In addition, WHITING used a USCG maintained Differential GPS station at Fort Macon, North Carolina, for performance checks. Positions obtained from USCG reference listings are:

Station	Latitude	Longitude
Charleston USCG DGPS Beacon	32° 45.45357' N	079° 50.57225' W
Fort Macon USCG DGPS Beacon	34° 41.84333' N	076° 40.98706' W

WHITING used *MONITOR* 1.2 to verify station positions and to check for multipath in the area. The digital data obtained from the *MONITOR* 1.2 program will be forwarded to N/CS31 in July 1996. Printouts from the *MONITOR* program are included in the Separates, section III. Data Filed with Field Records.

I. HYDROGRAPHIC POSITION CONTROL

A Differential Global Positioning System (DGPS) was used as the navigation system for this survey. Both launches and the ship used an Ashtech Sensor GPS receiver with a CSI MBX1 beacon receiver supplying correctors for DGPS navigation. Ashtech receivers were initialized by HDAPS and the CSI MBX1's were preset to the appropriate station and frequency.

DGPS positioning was accomplished in accordance with the Field Procedures Manual, section 3.4. The HDOP limit for a 1:10,000 scale survey using the Charleston station is 3.75. No position flyers were encountered. All suspect positions (high HDOP, DR'ed positions, high EPE) were examined for reliability. Questionable positions were either smoothed or rejected.

The serial numbers of the Ashtech Sensor and CSI MBX1 receivers on the data acquisition platforms are as follows:

Vessel	Device	Serial Number
2930	Ashtech Sensors	700417B1203
	CSI MBX1	A003789
2931	Ashtech Sensor	700417B1194
	CSI MBX1	X-1088
2932	Ashtech Sensor	700417B1055
	CSI MBX1	X-1079

DGPS performance checks on NOAA Ship WHITING were determined by using *SHIPDIM* version 2.1. The position determined using correctors from the Charleston DGPS tower was compared to the position determined using correctors from the Fort Macon DGPS beacon using two independent DGPS systems. *SHIPDIM* routinely showed the positions given by the two systems to be within 2-3 meters of each other.

DGPS performance checks for launches 1014 and 1015 were conducted with each launch secured in the WHITING davits and with all platforms using correctors from the Charleston DGPS tower. Simultaneous HDAPS positions were compared between WHITING and each launch. An offset in distance and azimuth was then calculated between the ship and each launch system. A summary of the DGPS performance checks is included in the Separates, section III.* All DGPS performance checks confirmed that the equipment was working properly.

DGPS antenna offsets were measured on April 2, 1996, for launches 1014 and 1015 and on March 19, 1993, for WHITING. Offsets and laybacks were measured using the high frequency echosounder transducer as the reference. Antenna heights were also measured on the same respective dates shown above, using the water line as the reference. The offsets and laybacks were applied by HDAPS on-line. A minimum of four satellites was used during survey H-10670 (1:10,000) providing altitude unconstrained positioning.

Offset, layback, and height corrections for each launch's SSS aft towing boom were measured on July 28, 1993, and verified on April 5, 1994. All offset, layback, and height data were applied by HDAPS on-line. Correctors from Offset Table 1* were applied to all data acquired from launch 1015. Correctors from Offset Table 2* were applied to all data acquired from launch 1014. Offset, layback, and height for WHITING's SSS towfish A-frame were measured on July 27, 1992, using the forward high frequency transducer as the reference. Correctors were entered into Offset Table 9.*

J. SHORELINE

There is no shoreline within the limits of survey H-10670.

* DATA Filed with Field Records.

K. CROSSLINES

A total of 78.9 nautical miles of crosslines, or 11% of the mainscheme mileage, was run on H-10670. Agreement between mainscheme and crossline soundings is adequate. Ninety percent (90 %) of the crossline soundings agree with mainscheme soundings to within 0.3 meters. The greatest difference noted was 0.6 meters. Differences were randomly shoal and deep with no noticeable trends.

L. JUNCTIONS *See also Evaluation Report.*

H-10670 junctions with the following two surveys: H-10671 (Sheet "B", 1:10,000) and H-10674 (Sheet "D", 1:10,000). Agreement with both surveys is adequate with most soundings agreeing to within 0.3 meters. Alignment between contour lines at the junctions is satisfactory.

M. COMPARISONS WITH PRIOR SURVEYS *See also Evaluation Report*

Comparisons were made between H-10670 and the following prior surveys: H-7172 (1946-1947, 1:40,000), H-8781 (1964, 1:20,000), and H-9174WD (1969, 1:40,000). All comparisons were made in feet. All prior surveys were referenced to NAD 27. The datum shift between NAD 27 and NAD 83 was calculated using *CORPSCON* (version 2.1) software and determined to be insignificant (0.5 mm at 1:40,000). No datum shift was applied in the comparisons. Results of the comparisons are as follows:

H-7172

On average, soundings outside of Fort Sumter Range agree to within 2 feet with prior survey H-7172. Soundings within the Fort Sumter Range are 2-10 feet deeper than those on prior survey H-7172. North of Fort Sumter Range at 32° 42' 58.20" N, 079° 45' 31.9" W a shoal of 22-25 feet was located 0.22 nautical miles southwest of the prior survey location of the shoal.

H-8781

Soundings outside of Fort Sumter Range, were within 2 feet of the soundings on prior survey H-8781. Soundings within Fort Sumter Range are an average of 7 feet deeper on this survey than on prior survey H-8781.

H-9174WD

No depths from H-10670 were found to be shoaler than cleared depths from prior survey H-9174WD.

N. ITEM INVESTIGATIONS

The following items were investigated by WHITING during this survey. Depths of features and surrounding depths are corrected to predicted MLLW.

N1. Side Scan Contact Number 6856.18S

Divers investigated the item on DN 144 and located a large pile of debris which included pieces of cement, cable and stanchions (fix number 4566). The least depth of the feature is 11.7 meters (MOD III Diver Least Depth Gauge), in surrounding depths of 12.7 meters. WHITING recommends that an obstruction be charted as follows: Concur

Latitude: 32° 38' 49.199" N
Longitude: 079° 44' 13.700" W
Least Depth: 11.~~7~~3 meters (37 FT)

chart 37 obstr

N2. Side Scan Contact Number 3465.34S

Divers investigated the item on DN 140 and located an old anchor (fix number 4565). The least depth of the item is 8.~~3~~5 meters (MOD III Diver Least Depth Gauge), in surrounding depths of 10.0 meters. WHITING recommends that an obstruction be charted as follows: Concur

Latitude: 32° 43' 11.546" N
Longitude: 079° 45' 07.229" W
Least Depth: 8.~~3~~5 meters (28FT)

chart 28 obstr

N3. Side Scan Contact 261.42P

Divers investigated the item on DN 114 and located an old buoy (fix number 4282). The least depth of the item is 9.~~4~~5 meters (MOD III Diver Least Depth Gauge), in surrounding depths of 10.6 meters. WHITING recommends that an obstruction be charted as follows: Concur

Latitude: 32° 40' 49.221" N
Longitude: 079° 44' 38.707" W
Least Depth: 9.~~4~~5 meters (31FT)

chart 31 obstr

N4. Side Scan Contact Number 19.15P

Divers investigated the item on DN 114 and located coral outcroppings (fix number 4280). The least depth of the feature is 13.~~8~~1 (43FT) meters (MOD III Diver Least Depth Gauge), in surrounding depths of ~~14.1~~ meters. WHITING recommends that representative survey depths be charted in the area. 13.7 (45 FT) Concur

LAT 32°41'15.348"N
LON 79°44'07.934"W

N5. AWOIS 9660 (Side Scan Contact Number 3968.54S)

AWOIS item 9660 is an artificial fishing reef at position 32° 42' 37.64" N, 079° 45' 41.29" W. Side scan sonar coverage of 200% was accomplished over the 500-meter search radius. Divers investigated the most significant feature in the fishing reef on DN 114 and located a sunken barge (fix number 4272). The least depth of the feature is 5.6 meters (MOD III Diver Least Depth Gauge). The item falls within the limits of a charted fish haven and exceeds the authorized minimum depth of 20 feet (6.1 meters). WHITING recommends that a wreck be charted: Concur

Latitude:	32° 42' 38.725" N
Longitude:	079° 45' 44.187" W
Least Depth:	5.6 meters (18 FT)

Chart 18 WK

This item was sent in as a danger to navigation (see Appendix I).

Several side scan contacts fell outside the limits of the charted fish haven. WHITING recommends that the center of the fish haven be moved to position 32° 42' 35.03" N, 079° 45' 37.78" W, with the relative size and shape remaining the same. Do not concur - retain fish haven as charted and chart additional contacts as allowed by chart scale. See also section 01 of the Evaluation Report.

N6. AWOIS 7579

AWOIS item 7579 is the sunken wreck of a 65-foot steel pilot boat charted (PD) at position 32° 42' 36.63" N, 079° 42' 53.28" W. Two-hundred percent (200%) side scan sonar coverage was obtained throughout the 2000-meter search radius about the charted wreck (PD) position. Only one significant contact was found in the search radius and fell outside the survey limits. This item which was located using SSS and investigated by divers on survey H-10671, matched the description of the AWOIS item vessel. WHITING recommends that the wreck (PD) at position 32° 42' 36.63" N, 079° 42' 53.28" W be removed from the chart and that a submerged wreck with a least depth of 28 feet be charted at 32° 43' 18.5" N, 079° 42' 27.9" W, as discussed in survey H-10671. This item was sent in as a danger to navigation ~~(see Appendix I)~~. Concur

N7. AWOIS 7575

AWOIS item 7575 is a reported obstruction visible at low tide at position 32° 40' 06.64" N, 079° 45' 59.29" W. Two-hundred percent (200%) side scan sonar coverage was obtained throughout the 2000-meter search radius about the location of the visible obstruction. Only one item appearing significant was found on the side scan records (side scan contact 4416.37). Divers investigated the item on DN 140 and located an aluminum cylinder (fix 4562). The least depth of the item is 11.4 meters (MOD III Diver Least Depth Gauge), in surrounding depths of 12.1 meters. ~~The item is insignificant;~~ WHITING recommends that the obstruction be removed

from the chart and that representative survey depths be charted in the area. CONCUR, IT IS ALSO RECOMMENDED THAT A 37 OBSTR BE CHARTED IN LAT. 32°39'31.88"N, LON 79°46'28.31"W

N8. AWOIS 512

AWOIS 512 is the 32-foot cleared depth charted at position 32° 39' 30" N, 079° 45' 42" W. AWOIS 512 fell within the 2000-meter search radius of AWOIS 7575. Two-hundred percent (200%) side scan sonar coverage was obtained over the charted position (see section N7), and no significant features were found. WHITING recommends that the 32-foot cleared depth charted at position 32° 39' 30" N, 079° 45' 42" W be removed from the chart and that representative survey depths be charted. CONCUR

O. COMPARISON WITH THE CHART SEE ALSO EVALUATION REPORT.

Comparisons were made between survey H-10670 and the following two charts: 11523 (15th ed., Jun. 25/94, 1:20,000), and 11521 (21st ed., Feb. 5/94, 1:80,000). Both comparisons were made in feet at the 1:10,000 scale. In general, agreement is adequate with most charted depths agreeing with survey soundings to within 3 feet. The overall trend appears to be a slight deepening throughout the survey area, except for isolated areas north of Fort Sumter Range which have shoaled by 3 feet. In addition, at 32° 42' ~~58.20~~ 57.49 N, 079° 45' ~~31.9~~ 24.97 W a shoal area with a least depth of ~~22~~ 23 feet was found near a charted 28-foot sounding, 0.22 nautical miles southwest of a charted 22-foot sounding. WHITING recommends that survey depths be charted in the area. CONCUR

The following were also noted:

1. The wreck (PD) charted at position 32° 42' 36.63" N, 079° 42' 53.28" W should be removed from the chart. Two hundred percent (200%) side scan sonar coverage was run throughout the search radius and the wreck was located at position 32° 43' 18.5" N, 079° 42' 27.9" W (see survey H-10671). WHITING recommends that a submerged wreck with a least depth of 28 feet be charted at the above position (see section N6). CONCUR

2. Several side scan contacts from survey H-10670 fell outside the limits of the charted fish haven north of Fort Sumter Range. WHITING recommends that the center of the fish haven be moved to position 32° 42' 35.03" N, 079° 45' 37.78" W, with the relative size and shape remaining the same. DO NOT CONCUR - SEE SECTION N5., PAGE 10 OF THIS REPORT FOR CHARTING RECOMMENDATION

3. A wreck was found in the fish haven at approximate position 32° 42' 37.64" N, 079° 45' 41.29" W with a least depth less than the authorized minimum least depth of 20 feet. The item was found at position 32° 42' 38.7" N, 079° 45' 44.2" W and has a least depth of 18 feet (see section N5). CONCUR

P. ADEQUACY OF SURVEY See also Evaluation Report

This survey is complete and adequate to supersede all prior surveys in their common area.

Q. AIDS TO NAVIGATION

All aids to navigation were visually verified during the survey. All aids appear adequate to serve their intended purpose. Four of the nine floating aids to navigation in the survey area were located at positions which differ from their charted positions on charts 11523 and 11521. The US Coast Guard was notified of the following:

Floating ATON	Position Charted	Position from Survey	Date Located
R "2A", Lighted	32° 41' 03.0" N 079° 43' 35.4" W	32° 41' 04.0" N 079° 43' 32.5" W	May 8, 1996
R "4", Lighted	32° 42' 07.2" N 079° 45' 50.4" W	32° 42' 09.1" N 079° 45' 53.0" W	May 8, 1996
Y "TB"	32° 39' 00.6" N 079° 43' 05.4" W	32° 38' 55.8" N 079° 43' 09.2" W	May 8, 1996
Y, N, Priv	32° 42' 38.4" N 079° 45' 40.8" W	32° 42' 35.7" N 079° 45' 40.8" W	May 7, 1996

R. STATISTICS

Number of Positions	5486
Main-scheme Sounding Lines (Nautical Miles)	720
Crosslines (Nautical Miles)	79
Square Nautical Miles Surveyed	2.3
Days of Production	19
Detached Positions	32
Bottom Samples	16
Tide Stations Installed	None
Current Stations	None
Number of CTD Casts	8
Magnetic Stations	None

S. MISCELLANEOUS See also Evaluation Report.

No anomalies in either tide or current and/or unusual magnetic variations were encountered in the survey area. No unusual submarine features were discovered. Bottom samples were submitted to the Smithsonian Institution.

T. RECOMMENDATIONS See also Evaluation Report.

No additional field work is required. There are no current plans for construction or dredging in the survey area.

U. REFERRAL TO OTHER REPORTS

A Chart User Evaluation Report was submitted in June 1996 as part of OPR-G342-WH. A Coast Pilot Report will be submitted in July 1996.

Submitted by:

Juliana Pikulsky

Lieutenant Juliana Pikulsky, NOAA
NOAA Ship WHITING

Christopher Parrish

Ensign Christopher Parrish, NOAA
NOAA Ship WHITING

HORIZONTAL CONTROL STATIONS

Station:	**Charleston Coast Guard Beacon**
Latitude:	32° 45.45357' N
Longitude:	079° 50.57225' W
Frequency:	298 MHZ
Station ID (Antennae A):	016
Transmission Rate:	100 BPS

Station:	**Fort Macon Coast Guard Beacon**
Latitude:	34° 41.84333' N
Longitude:	076° 40.98706' W
Frequency:	294 MHZ
Station ID (Antennae A):	014
Transmission Rate:	100 BPS

02/12/97

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H-10670

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	5486
NUMBER OF SOUNDINGS	32506

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	13	06/24/96
VERIFICATION OF FIELD DATA	112.50	01/06/97
QUALITY CONTROL CHECKS	0	
EVALUATION AND ANALYSIS	16	
FINAL INSPECTION	4	09/25/96
COMPILATION	124	02/07/97
TOTAL TIME	270	

ATLANTIC HYDROGRAPHIC BRANCH APPROVAL 09/26/96

APPROVAL SHEET
HYDROGRAPHIC SURVEY
OPR-G342-WH
1996
WH-10-2-96
H-10670

The data for this survey were acquired and checked under my daily supervision. Position and sounding accuracy meet the requirements specified in the Project Instructions, Hydrographic Manual, Hydrographic Survey Guidelines and the Field Procedures Manual for Hydrographic Surveying. This survey is complete and adequate for the intended purpose of delineating bottom topography, determining depths, and identifying all potential dangers to navigation. No final field sheets were prepared for this survey. The survey data and accompanying records are complete for the preparation of the smooth sheet.

Approved by:

Maureen R. Kenny

Commander Maureen R. Kenny, NOAA
Commanding Officer, NOAA Ship WHITING

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of NOAA Corps Operations
NOAA Ship WHITING S-329
439 W. York Street
Norfolk, VA 23510-1114

June 14, 1996

Commander, Seventh Coast Guard District
Brickell Plaza Federal Building Room 406
909 SE First Avenue
Miami, Florida 33131-3050

CAUTION
ADVANCE INFORMATION
SUBJECT TO OFFICE REVIEW

Dear Sir:

The NOAA Ship WHITING, while conducting hydrographic survey operations in the approaches to Charleston, South Carolina, located three features which constitute dangers to navigation. Enclosed are reports concerning these features which should be placed in the next Notice to Mariners. The following table summarizes our findings:

Feature	Latitude	Longitude	Depth
Obstruction	32° 33' 18.9" N	079° 40' 15.7" W	44 ft
Wreck	32° 43' 18.5" N	079° 42' 27.9" W	28 ft
Obstruction	32° 42' 38.7" N	079° 45' 44.2" W	18 ft

In addition, the aids to navigation (ATONS) listed below were located at positions which differ from their charted positions:

Floating ATON	Position Charted	Position from Survey	Date Located
RW Mo(a) "C"	32° 39' 40.0" N 079° 40' 53.0" W	32° 39' 38.3" N 079° 40' 51.0" W	May 19, 1996
Y "B", N	32° 38' 00.0" N 079° 41' 30.0" W	32° 37' 54.0" N 079° 41' 25.2" W	May 19, 1996
R "2A", Lighted	32° 41' 03.0" N 079° 43' 35.4" W	32° 41' 04.0" N 079° 43' 32.5" W	May 8, 1996
R "4", Lighted	32° 42' 07.2" N 079° 45' 50.4" W	32° 42' 09.1" N 079° 45' 53.0" W	May 8, 1996
Y "TB"	32° 39' 00.6" N 079° 43' 05.4" W	32° 38' 55.8" N 079° 43' 09.2" W	May 8, 1996
Y, N, Priv	32° 42' 38.4" N 079° 45' 40.8" W	32° 42' 35.7" N 079° 45' 40.8" W	May 7, 1996

Differential GPS was used to determine the survey positions of both the ATONS and the dangers

REPORT OF DANGER TO NAVIGATION

Hydrographic Survey Registry Number: H-10670
State: South Carolina
General Locality: North Atlantic Ocean
Sublocality: 4.0 NM SE of Rattlesnake Shoal
Project Number: OPR-G342-WH, NOAA Ship WHITING

The following item was discovered during hydrographic survey operations:

A sunken barge was located using side scan sonar and investigated by divers. The item is covered 18 feet corrected to MLLW using predicted tides and falls within the limits of a charted fish haven with an authorized minimum depth of 20 feet.

Affected nautical charts:

CHART	EDITION	DEPTH	DATUM	LATITUDE	LONGITUDE
11523	15th, Jun 25/94	18 ft	NAD 83	32° 42' 38.7" N	079° 45' 44.2" W
11521	21st, Feb 5/94	18 ft	NAD 83	32° 42' 38.7" N	079° 45' 44.2" W

Questions concerning this report should be directed to the NOAA Atlantic Hydrographic Branch in Norfolk, Virginia, at telephone number (804) 441-6746.

CAUTION
ADVANCE INFORMATION
SUBJECT TO OFFICE REVIEW

REPORT OF DANGER TO NAVIGATION

Hydrographic Survey Registry Number: H-10671
State: South Carolina
General Locality: North Atlantic Ocean
Sublocality: 5.0 NM SE of Rattlesnake Shoal
Project Number: OPR-G342-WH, NOAA Ship WHITING

The following item was discovered during hydrographic survey operations:

A submerged wreck was found with side scan sonar and investigated by divers. The wreck is covered 28 feet corrected to MLLW using predicted tides.

Affected nautical charts:

CHART	EDITION	DEPTH	DATUM	LATITUDE	LONGITUDE
11521	21st, Feb 5/94	28 ft	NAD 83	32° 43' 18.5" N	079° 42' 27.9" W

Questions concerning this report should be directed to the NOAA Atlantic Hydrographic Branch in Norfolk, Virginia, at telephone number (804) 441-6746.

CAUTION
ADVANCE INFORMATION
SUBJECT TO OFFICE REVIEW

REPORT OF DANGER TO NAVIGATION

Hydrographic Survey Registry Number: H-10674
State: South Carolina
General Locality: North Atlantic Ocean
Sublocality: 11.0 NM SE of Rattlesnake Shoal
Project Number: OPR-G342-WH, NOAA Ship WHITING

The following item was discovered during hydrographic survey operations:

Metal cylinders in the vicinity of a South Carolina fish restoration project buoy were found with side scan sonar and investigated by divers. The feature is covered 44 feet corrected to MLLW using predicted tides.

Affected nautical charts:

CHART	EDITION	DEPTH	DATUM	LATITUDE	LONGITUDE
11521	21st, Feb 5/94	44 ft	NAD 83	32° 33' 18.9" N	079° 40' 15.7" W

Questions concerning this report should be directed to the NOAA Atlantic Hydrographic Branch in Norfolk, Virginia, at telephone number (804) 441-6746.

CAUTION
ADVANCE INFORMATION
SUBJECT TO OFFICE REVIEW

to navigation listed above. Positions are referenced to NAD 83. All depths are referenced to MLLW using predicted tides. Charts 11523 and 11521 are affected by this report.

A copy of this letter and enclosures have been forwarded to the following offices:

Chief, Marine Charting Division, NOAA
Chief, AMC Operations Division, NOAA
Chief, Atlantic Hydrographic Branch, NOAA
Director, Defense Mapping Agency
Hydrographic/Topographic Agency
President, Charleston Pilots Association

Sincerely,

Maureen R. Kenny

Maureen R. Kenny
Commander, NOAA
Commanding Officer

Enclosures
cc: AMC1
N/CS2
N/CS33
DMAHTC

CAUTION
ADVANCE INFORMATION
SUBJECT TO OFFICE REVIEW

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Ocean and Earth Sciences
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: July 22, 1996

HYDROGRAPHIC SECTION: Atlantic

HYDROGRAPHIC PROJECT: OPR-G342-WH

HYDROGRAPHIC SHEET: H-10670

LOCALITY: Atlantic Ocean, S.C.

TIME PERIOD: April 5 - May 23, 1996

TIDE STATION USED: 866-5530 Charleston, S.C.
Lat. 32° 46.9'N Lon. 79° 55.5'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 2.49 ft.

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 5.5 ft.

REMARKS: RECOMMENDED ZONING

Apply a -24 minute correction to times and a X0.95 range ratio to heights using Charleston, S.C. (866-5530).

Note: Times are tabulated in Greenwich Mean Time.

William M. Stevenson
CHIEF, DATUMS SECTION

NOAA FORM 76-155
(11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

SURVEY NUMBER

H-10670

GEOGRAPHIC NAMES

Name on Survey	A ON CHART NO. 11521, 11520, 11480	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
NORTH ATLANTIC OCEAN	X		X							1
RATTLESNAKE SHOAL (title)	X									2
SOUTH CAROLINA (title)	X		X							3
										4
										5
										6
										7
										8
										9
										10
										11
										12
										13
										14
										15
										16
										17
										18
										19
					Approved:					20
										21
										22
					Chief Geographer					23
					SEP 30 1996					24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

02/12/97

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H-10670

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	5486
NUMBER OF SOUNDINGS	32506

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	13	06/24/96
VERIFICATION OF FIELD DATA	112.50	01/06/97
QUALITY CONTROL CHECKS	0	
EVALUATION AND ANALYSIS	16	
FINAL INSPECTION	4	09/25/96
COMPILATION	124	02/07/97
TOTAL TIME	270	

ATLANTIC HYDROGRAPHIC BRANCH APPROVAL 09/26/96

ATLANTIC HYDROGRAPHIC BRANCH
EVALUATION REPORT FOR H-10670 (1996)

This Evaluation Report has been written to supplement and/or clarify the original Descriptive Report. Sections in this report refer to the corresponding sections of the Descriptive Report.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

The following software was used to process data at the Atlantic Hydrographic Branch:

Hydrographic Processing System
NADCON, version 2.10
AutoCAD, Release 12
QUICKSURF, version 5.1
MicroStation, version 5.0
I/RAS B, version 5.01

The smooth sheet was plotted using an ENCAD NovaJet III plotter.

H. CONTROL STATIONS

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD 83). Office processing of this survey is based on these values. The smooth sheet has been annotated with ticks showing the computed mean shift between the NAD 83 and the North American Datum of 1927 (NAD 27).

To place this survey on the NAD 27, move the projection lines 0.644 seconds (19.842 meters or 1.98 mm at the scale of the survey) north in latitude, and 0.708 seconds (18.440 meters or 1.84 mm at the scale of the survey) east in longitude.

L. JUNCTIONS

H-10671 (1996) to the east
H-10674 (1996) to the south

Standard junctions were effected between the present survey and surveys H-10671 (1996) and H-10674 (1996).

There are no junctional surveys to the north or west. Present survey depths are in harmony with the charted hydrography to the north and west.

M. COMPARISON WITH PRIOR SURVEYS

A comparison with prior surveys was not done during office processing in accordance with section 4. of the memorandum titled "Changes to Hydrographic Survey Processing", dated May 24, 1995.

O. COMPARISON WITH CHARTS 11521 (21nd Edition, Feb 5/94) 11523 (15th Edition, Jun 25/94)

Hydrography

The charted hydrography originates with prior surveys and requires no further consideration. The hydrographer makes adequate chart comparisons in sections N. and O. of the Descriptive Report. The following should be noted:

1) An uncharted obstruction with a depth of 29 feet (8^{9} m), in Latitude 32°42'39.30"N, Longitude 79°45'37.49"W, was located by the field unit. The 29 Obstr is within the limit of a charted Obstn Fish Haven. It is recommended that the 29 Obstr not be charted.

2) An uncharted obstruction with a depth of 28 feet (8^{6} m), in Latitude 32°42'39.21"N, Longitude 79°45'34.42"W, was located by the field unit. It is recommended that a 28 Obstr be charted in present survey location.

3) An uncharted obstruction with a depth of 29 feet (9 m), in Latitude 32°42'35.97"N, Longitude 79°45'29.71"W, was located by the field unit. It is recommended that a 29 Obstr be charted in present survey location.

4) An uncharted obstruction with a depth of 28 feet (8^{5} m), in Latitude 32°42'31.03"N, Longitude 79°45'35.50"W, was located by the field unit. It is recommended that a 28 Obstr be charted in present survey location.

5) An uncharted wreck with a depth of 19 feet (5^{8} m), in Latitude 32°42'33.82"N, Longitude 79°45'36.71"W, was located by the field unit. It is recommended that a 19 Wk be charted in present survey location.

6) An uncharted obstruction with a depth of 26 feet (8^{1} m), in Latitude 32°42'32.02"N, Longitude 79°45'38.22"W, was located by the field unit. The 26 Obstr is within the limit of a charted Obstn Fish Haven. It is recommended that the 26 Obstr not be charted.

7) An uncharted obstruction with a depth of 28 feet (8^5 m), in Latitude 32°42'29.31"N, Longitude 79°45'41.56"W, was located by the field unit. It is recommended that a 28 Obstr be charted in present survey location.

8) An uncharted obstruction with a depth of 31 feet (9^4 m), in Latitude 32°38'28.63"N, Longitude 79°42'59.02"W, was located by the field unit. It is recommended that the obstruction be charted as shown on the present survey.

9) An uncharted obstruction with a depth of 42 feet (12^8 m), in Latitude 32°38'49.56"N, Longitude 79°44'54.77"W, was located by the field unit. Shoaler soundings exist in the immediate vicinity of this item. It is recommended that the obstruction not be charted.

10) An uncharted obstruction with a depth of 39 feet (11^9 m), in Latitude 32°41'42.98"N, Longitude 79°42'33.37"W, was located by the field unit. It is recommended that a 39 Obstr be charted in present survey location.

11) An uncharted obstruction with a depth of 24 feet (7^3 m), in Latitude 32°42'57.48"N, Longitude 79°48'23.99"W, was located by the field unit. It is recommended that a 24 Obstr be charted in present survey location.

12) An uncharted obstruction with a depth of 24 feet (7^3 m), in Latitude 32°42'48.04"N, Longitude 79°48'20.79"W, was located by the field unit. Shoaler soundings exist in the immediate vicinity of this item. It is recommended that the obstruction not be charted.

13) An uncharted obstruction with a depth of 25 feet (7^6 m), in Latitude 32°42'55.48"N, Longitude 79°47'28.67"W, was located by the field unit. It is recommended that a 25 Obstr be charted in present survey location.

14) An uncharted obstruction with a depth of 42 ft (12^8 m), in Latitude 32°43'12.56"N, Longitude 79°48'06.62"W, was located by the field unit. Shoaler soundings exist in the immediate vicinity of this item. It is recommended that the obstruction not be charted.

15) An uncharted obstruction with a depth of 30 feet (9^1 m), in Latitude 32°43'34.71"N, Longitude 79°48'33.99"W, was located by the field unit. It is recommended that a 30 Obstr be charted in present survey location.

16) An uncharted obstruction with a depth of 29 feet (8[8] m), in Latitude 32°43'29.54"N, Longitude 79°48'32.81"W, was located by the field unit. It is recommended that a 29 Obstr be charted in present survey location.

The present survey is adequate to supersede the charted hydrography within the common area.

Danger to Navigation

One Danger to Navigation report was submitted to Commander (oan), Seventh Coast Guard District, Miami, Florida for inclusion in the Local Notice to Mariners, and to the Marine Chart Division, N/CS3x1, Silver Spring, Maryland. A copy of the report is appended to this the report.

P. ADEQUACY OF SURVEY

This is an adequate hydrographic/side scan sonar survey. No additional work is recommended.

S. MISCELLANEOUS

Chart compilation was done by Atlantic Hydrographic Branch personnel, in Norfolk, Virginia. Compilation data will be forwarded to Marine Chart Division, Silver Spring, Maryland.

WHITING Processing Team

Robert Snow

Robert Snow
Cartographic Technician
Verification of Field Data
Evaluation and Analysis

APPROVAL SHEET
H-10670

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of depth curves, development of critical depths, cartographic symbolization, and verification or disproval of charted data. The digital data have been completed and all revisions and additions made to the smooth sheet during survey processing have been entered in the digital data for this survey. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Robert G. Roberson Date: SEPTEMBER 26, 1996
Robert G. Roberson
Cartographer
Chief, Cartographic Section

I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.

Nicholas E. Perugini Date: September 26, 1996
Nicholas E. Perugini
Commander, NOAA
Chief, Atlantic Hydrographic Branch

****

Final Approval:

Approved: Andrew A. Armstrong III Date: April 30, 1997
Andrew A. Armstrong, III
Captain, NOAA
Chief, Hydrographic Surveys Division

NOAA FORM 75-96
(10-83)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10670

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.
1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
11523	1/22/97	[illegible]	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. FULL APPLICATION OF SOUNDINGS + CURVES
			FROM SMOOTH SHEET
11518	2/3/97	[illegible]	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. FULL APPLICATION OF SOUNDINGS + CURVES
			FROM SMOOTH SHEET THRU 11523
11521	2/7/97	[illegible]	Full Part Before After Marine Center Approval Signed Via
			Drawing No. FULL APPLICATION OF SOUNDINGS AND
			CURVES FROM SMOOTH SHEET THRU 11523 + 11518
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
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			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.